



•保护与治理对策•

# 植物系统发生海报——以演化视角介绍植物多样性的科教资料项目

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**摘要:** 中国的植物多样性保护行动虽然提升了公众对多样性的认识, 但这些努力往往未能深入到理解植物多样性演化及其保护的深层意义。从演化的视角进行植物多样性宣传教育, 有利于促进对多样性的综合理解, 增进对多样性保护的认可。然而, 现有资料多集中于物种的识别、鉴定与分类, 缺乏从生物演化角度对植物多样性进行系统性介绍的内容。本文介绍了一个具有全球影响力的科教资料案例——由美裔德国植物学家Theodor C. H. Cole发起的植物系统发生海报(Plant Phylogeny Posters)项目。该项目通过整合最新的系统与演化植物学研究成果, 以系统发生为线索介绍植物多样性及其亲缘关系, 旨在利用系统发生树所蕴含的丰富演化思想内涵, 启发读者理解植物多样性与演化。海报以系统发生树结合植物类群的形态、地理分布、物种数量等数据信息, 直观展示了多个分类等级的重要类群的演化历史。在数十所大学和科研机构的45位研究人员的努力下, 70张系统发生海报已被翻译成中文, 并向所有人免费开放获取。这一科教项目有望为增进公众深入理解植物多样性及其保护行动提供宝贵的资源和帮助。

**关键词:** 植物多样性; 演化; 系统发生; 科教资料

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## Plant Phylogeny Posters—An educational project on plant diversity from an evolutionary perspective

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### ABSTRACT

**Background:** Conservation activities in China have raised public awareness about plant diversity, but these efforts have not been sufficient to enhance a true understanding of plant evolution and the underlying principles and objectives of

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biodiversity conservation. A more effective communication and profound education of plant diversity from an evolutionary perspective is paramount for a comprehensive understanding of biodiversity and appreciation of the significance of biodiversity conservation. Most references to plant biodiversity focus on species identification and classification, with limited attention to evolutionary perspectives.

**Summary:** Here, we introduce the global “Plant Phylogeny Posters” project, a portfolio of educational tools developed by the German-American botanist Theodor C. H. Cole. This project is aimed to present clear overviews of plant diversity and relationships from a phylogenetic perspective from recent systematic and evolutionary studies in botany, providing the means for a better understanding of plant diversity and evolution. The posters display the phylogenetic trees of major plant taxa at different ranks alongside morphological characteristics, geographical distributions, and the number of plants at each rank.

**Progress & Perspectives:** Through the collaborative efforts of 45 Chinese researchers from various universities and research institutions, all 70 posters of this project have now been translated into Chinese and made freely available worldwide. This project promises to improve the understanding of plant biodiversity and conservation efforts in China.

**Key words:** plant diversity; evolution; phylogeny; educational resources

当前,中国主要通过“政府引导、企业行动、公众参与”的方式开展植物多样性保护行动,致力于提高社会各界对植物多样性的认识。首先,国家已制定和通过了一系列的生物多样性相关法律、法规和政策,促进公众对保护植物多样性的基本了解。例如,2022年,《生物多样性公约》第十五次缔约方大会达成《昆明-蒙特利尔全球生物多样性框架》(以下简称《昆蒙框架》),其“K部分”(Section K)指出,强化对生物多样性的沟通、教育和宣传,对于全社会理解、执行框架,改变生活方式,进而提升对生物多样性保护的支持至关重要。此外,《昆蒙框架》的2030全球行动目标(global targets)中,“目标16”强调通过改善教育与获得准确的多样性信息,以便减少对多样性造成破坏的消费,实现人与地球的和谐共处;“目标21”则指出,通过强化数据、信息和知识对于决策者、从业人员和公众的可获取性,提升生物多样性的治理和管理水平,并加强宣传、教育和知识管理等。2024年,生态环境部发布了《中国生物多样性保护战略与行动计划(2023–2030年)》,其中“优先行动4”强调通过建立健全生物多样性宣传、教育、科普体系,到2030年,显著提升全社会的生物多样性保护意识;“优先行动27”则提出,要加强国际合作,推动生物多样性知识、信息等的共享。同时,新闻报道和社交媒体对植物多样性的广泛关注有助于形成流行文化,激发公众对植物多样性的热爱和兴趣。此外,国家公园、自然博物馆、植物园等机构也通过举办植物识别和植物保护宣传等科普教育活动,增进公众对生物多样性保护对象的感性认识,从而有效传播植物多样性知识(魏钰等,

2023)。公众自发组织的辨识植物和记录物候等博物学活动,不但可以亲近自然,提升生活品质,还可以提升民众对植物多样性的兴趣。目前,植物多样性相关的活动有助于社会各界认识植物多样性,也使公众参与生物多样性保护的意识得到显著提升(黄继红和臧润国, 2021; 魏辅文等, 2021)。

## 1 理解植物多样性及保护行动的重要意义

在我国,生物多样性保护主要由政府主导,但公众自下而上的参与程度尚显不足(魏辅文等, 2021)。值得一提的是,虽然相关活动提升了公众意识,但是地方政府、企业和普通民众不一定能够通过这些行动理解到植物多样性的重要性和必要性,以及植物多样性保护的原因和目的,即并未真正实现多样性保护意识的“主流化”(杨锐等, 2019)。要真正理解植物多样性及其保护,需要通过自然教育,让公众从科学的角度掌握一些关键议题(杨锐等, 2019),包括植物物种多样性和遗传多样性的不可或缺性,植物多样性的破坏的不可逆性,以及植物就地保护的不可替代性等。这些重要议题的理论基础是植物多样性的形成和维持机制。只有当公众对这些基础理论有一定的了解之后,他们才能更深刻认识到植物多样性的重要性和必要性,并主动投身于保护行动。那么,从什么角度介绍植物多样性可以促进公众理解植物多样性及保护呢?

生物多样性是生物长期演化的产物(Santamaría & Mendez, 2012; 薛成等, 2022)。演化的基本原则决定了生物多样性的形成,这一过程需要漫长的时间积累。例如,现生的每个物种都是生命之树上的叶

节点(leaf node), 它们共享一个共同祖先。未有证据能表明一个物种比另一个物种“高级”, 每个物种都有其特有的生物学意义。又如, 植物物种的形成平均需要约两百万年(Hedges et al, 2015), 这一时间跨度远超人类的文明史。再如, 遗传多样性的保护依赖于可遗传突变的保留和维持一定的居群/种群大小。这些因素共同作用, 使得生物多样性一旦遭受损失, 就难以恢复。因此, 了解演化对于全面理解生物多样性至关重要。

从演化角度理解植物多样性, 可以从多方面助力生物多样性保护。首先, 这种理解有助于让公众认识到生物多样性的不可逆性。理解生物多样性的形成和维持机制, 可以让公众认识到, 尽管对于环境和生态多样性的破坏可以从表面恢复, 但是生物多样性的多种要素一旦丧失便无法再复原。其次, 这种理解可以促进学术界其他领域的研究者利用生物多样性, 推动学科交叉研究, 从而让社会从生物多样性保护中受益。例如, 基因组学和发育生物学等基础学科的研究人员可以通过理解植物多样性, 获取更多的研究资源。此外, 这种理解还可以为植物育种和园艺等应用学科提供潜在的遗传资源, 为新材料、新能源等新兴交叉学科提供崭新的研究思路, 进而促进科学、社会和国家发展。第三, 深入理解生物多样性有利于社会各界以更加合理的方式保护多样性。政策制定者在尊重专家学者意见的基础上, 可以更合理地开展生物多样性保护工作, 支持相关的政策和立法, 并科学评估保护成果的成效, 从而从多个层面和角度有效保护生物多样性(杨锐等, 2019; 刘华杰, 2022; 魏钰等, 2023)。

综上所述, 从演化角度理解植物多样性, 不仅有助于推动社会各界更深入地了解保护对象和保护原因, 而且能够提高公众对保护植物多样性意义的认识, 激发公众参与和支持植物多样性保护行动, 推动相关机构和政府科学地进行保护, 并有效评估保护成效, 这对于植物多样性保护具有深远意义。

## 2 现有资料只能有限促进植物多样性理解

由于不同人群的特点和需求不一, 推动社会各界深入理解植物多样性, 需要依赖高质量的、普适性的资料。对于政府、企业和普通民众而言, 免费、直观、简洁且图形化的资料可以在不具备基础知识

的情况下, 引导他们接触、了解植物多样性, 逐步提升对多样性保护的兴趣与支持。对于自然爱好者、科普工作者、保护工作人员等, 具有一定理论深度的资料可以促进他们理解植物多样性保护的深层次意义, 从而促进相关信息与知识的传播和共享。对于植物多样性领域的教师和研究人員, 简明且具有时效性、系统性和综合性的资料将对教材编写、教学和科研提供极大的便利。

植物多样性研究历史悠久, 跨度大, 相关研究涉及多个领域, 包括植物形态学、解剖学、分类学、系统发生学、生态学、生物地理学、分子生物学和生物信息学等。植物多样性领域的纸质资料丰富, 随着互联网时代的到来, 生物多样性相关的网络数据库和电子科普资料变得日益多样。尽管植物多样性的相关资料众多, 但这些资料普适性略显不足, 部分资料的质量甚至可能无法得到保障。

植物多样性的研究涉及面广, 要充分理解这些资料, 需要较强的知识背景。现有的研究资料, 如植物志、植物名录、专著和期刊文献等, 专业性较强, 对同领域初学者可能存在一定的理解难度。对于领域外的科研人员和公众来说, 获得有效信息的难度更大。此外, 一些纸质资料可能由于发表时间较早、未再版或编辑水平限制, 未能包括最新的研究成果, 导致时效性不足。通常获取这些纸质资料和研究论文需要付费, 这限制了资料的可获取性。互联网的发展虽然让大量植物多样性资料可以免费获取, 但这些资料易于变动且不易追溯更改历史, 可能未经过审校, 难以辨别真伪, 权威性不足, 容易误导读者。社交媒体上的科普资料虽然可能由有相关背景的专家学者编写, 但往往覆盖面有限, 系统性不足。更重要的是, 现有的资料往往偏向于特定的植物谱系和研究领域, 如被子植物的物种多样性、识别和鉴别特征, 而从演化角度介绍植物多样性的资料相对较少。

鉴于此, 为提升政府、社会机构、学者和公众对植物多样性的理解, 迫切需要开发兼具免费、综合性、权威性、系统性、普及性、时效性的科教资料。

## 3 植物系统发生海报项目多方面促进理解植物多样性

植物系统发生海报(Plant Phylogeny Poster)就



是兼具上述各种特点的科教资料项目。该项目基于最新的植物系统发生学研究成果进行编纂, 这些海报不仅设计美观, 配色得当, 图文简洁, 而且详细展示了植物类群的系统发生树和演化关系, 同时包括了形态特征、地理分布等信息。每张海报都列出了参考的相关研究文献来源。这一项目通过机构主页和ResearchGate平台免费向全球社区提供海报, 并保持动态更新。该项目可以从多个方面促进对植物多样性的理解:

第一, 可以促进对陆生植物各大类群及其较低分类阶元物种多样性的了解, 以及不同分类阶元之间相互关系的最新进展。植物系统发生海报介绍了多个分类阶元的植物类群。已完成的70张海报中, 包括5张关于较高分类学层级的海报: 有胚植物(Embryophytes)、苔藓植物(Bryophytes)、维管植物(Tracheophytes)、蕨类和石松类植物(Pteridophytes, 即广义的蕨类植物)和被子植物(Angiosperms)。其他海报进一步覆盖了多个重要的分类阶元, 主要囊括了具有重要科学意义和公众兴趣的种子植物类群, 包括10张目级、48张科级和5张科以下分类阶元的海报, 具有非常高的系统发生覆盖度。海报中的系统发生树基于系统与演化植物学期刊上发表的最新研究而生成。例如, 被子植物的系统发生海报(APP)主要基于APG IV系统, 并将在不久后更新为APG V。目前, 该项目大部分系统发生树基于叶绿体基因组, 而最近的更新中也考虑了来自核基因组的数据。未来, 该项目将继续对有一定规模的重要分类阶元制作新海报。

第二, 可以促进深入理解多样性产生背后的演化基础。系统发生学是构建生物多样性的分类学、系统发生及演化机制之间的桥梁。伴随分子系统发生学的发展, 分类群内部与分类群之间的演化关系可以通过系统发生树进行更准确地阐释。植物系统发生海报中的系统发生树, 可以让读者理解植物分类阶元划分的理论基础以及数据支持, 而并非主观臆断。此外, 该项目还可以从多个角度引导读者了解演化生物学的一系列基本概念。首先, 系统发生树可以展现分类群的多样性是逐渐产生的, 而并非恒定不变, 也不是被突然创造的。其次, 不同分类阶元之间的演化关系可以以树的形式展示, 体现了演化是普遍存在的。然后, 海报间系统发生树的差

异说明不同分类阶元经历的演化事件不同, 其演化过程也有所不同。最后, 系统发生树的形式可以促进对分类群共享最近共同祖先(most recent common ancestor)的深入理解。

第三, 可以促进理解生物多样性研究与保护的社会价值。在人类生产生活不同方面扮演各种重要角色的植物物种, 零散分布在系统发生海报的不同分类阶元中。系统发生海报为生物多样性提供的演化背景可以帮助读者充分认识到, 人类文化中不可或缺的植物多样性资源是演化的产物。因此, 读者可以通过海报项目了解对植物多样性保护对于促进人类文明福祉的意义。

因此, 植物系统发生海报项目不但结合最新研究对植物多样性的分类学和系统发生背景进行了综合性介绍, 而且通过系统发生这一核心线索, 强调了基于演化的理念理解植物多样性的重要性和必要性。该项目既对科学研究、植物学相关的教学和教材编写具有参考价值, 也对制作科普、自然教育、自然主题的自媒体资料等生物多样性宣传内容提供了重要的科学依据。

#### 4 植物系统发生海报是国际合作推动生物多样性知识共享的科教项目

植物系统发生海报这一科教项目从诞生至今已有超过15年的历史。项目创始人Theodor C. H. Cole的初衷是创造一种教学和学习工具, 通过结合系统发生树, 仿照传统植物学教学中使用的挂图资料, 以海报的形式提供对被子植物系统演化关系的综合概述。该项目始于2007年, 最初由柏林De Gruyter Publishers以德文印刷出版, 并通过柏林自由大学机构主页提供电子版(Cole & Hilger, 2007)。随着ResearchGate在2008年成立, 这一全球科学家的免费网络平台吸引了越来越多的学者、研究人员和学生。2012年, 该项目第一张英文版植物系统发生海报在ResearchGate上发布, 受到了用户的广泛欢迎。

本文作者蒋陈焜认识到“被子植物系统发生海报”这一项目对中国植物多样性科普、教育和研究的潜力后, 与Theodor C. H. Cole商讨把海报翻译为中文版本的合作可能, 这一始于2014年的合作促成了该项目多语言版本的诞生和发展。至今, 全球超

过50多个国家的250多名植物学家、教育工作者和研究科学家组成的全球团队参与了这一项目, 植物系统发生海报系列扩展到60余个植物类群, 涵盖包括英语、汉语、西班牙语、葡萄牙语、法语、阿拉伯语、德语和俄语在内的45种语言版本, 总计850张海报。目前, 一个由世界多所大学和研究机构的45名华人植物学家和研究人員组成的团队(附录1), 已经完成了这70张海报的中文翻译工作(附录2, 3)。

“植物系统发生海报”已经成为一种宝贵的学习辅助工具和教学参考资料。海报可以在课堂或讲座中以投影形式呈现, 并通过放大显示细节, 用于教育展示或讲座(图1)。海报已被应用于编写野外实习教学手册(李晟等, 2023)。海报也可以打印成A0或更大的尺寸, 以便在演讲厅或科研、科普机构中展示。目前, 海报已被广泛应用于世界各地的博物馆和植物标本室中, 作为装饰和教育工具(Cole et al, 2021a, b; Dashzeveg et al, 2022; Godin & Cole, 2023)。该海报项目每天的在线浏览量超过600次, 显示其在全球植物多样性教育中的重要作用。

最近有学者呼吁, 通过国际合作的方式, 增强植物多样性领域人才的教育与培养, 这将更有利于多样性保护工作的开展, 进而实现《昆蒙框架》的2030全球行动目标(Liu, 2024)。植物系统发生海报正是通过国际合作, 实现全球性的植物多样性知识传播与共享的成功案例。随着海报被全面翻译为中文, 预计将进一步增强植物多样性教育和科普工作





**图1** 2024年4月北京大学饶广远教授在“植物生物学”课堂使用有胚植物与被子植物系统发生海报教学(摄影: 蒋陈焜)  
Fig. 1 Prof. Guang-Yuan Rao teaching the *Plant Biology* course at Peking University using the Embryophyte Phylogeny Poster (EmbPP) and the Angiosperm Phylogeny Poster (APP) in April 2024. (Credit: Chen-Kun Jiang)


的成效, 引导中国民众增强对植物多样性的认识、理解、关注与支持, 为全社会共同推动植物多样性的保护做出积极贡献。


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## 附录 Supplementary Material

<https://www.biodiversity-science.net/CN/10.17520/biods.2024210>

附录1 中文版植物系统发生海报译者信息  
Appendix 1 Affiliations of the translators of the Chinese versions of the Plant Phylogeny Posters

英文姓名 English name	中文姓名 Chinese name	所译海报缩写 translated poster name	Abbreviation of	隶属机构 Affiliation
Lin Bai	白琳	ZingPP		Kunming Institute of Botany (KUN), CAS, Kunming, Yunnan
Pei-Yi Cao	曹配懿	CrassPP, KalPP		School of Life Sciences, Peking University, Beijing
Shaotian Chen	陈绍田	BignonPP		Kunming Institute of Botany (KUN), CAS, Kunming, Yunnan
Ken-Yu Cheng	郑耕宇	AsphodPP		National Sun Yat-sen University, Kaohsiung, Taiwan
Tian-Yu Cui	崔天羽	PapaPP		School of Life Sciences, Peking University, Beijing
Wenpan Dong	董文攀	OleaPP		School of Ecology and Nature Conservation, Beijing Forestry University, Beijing
Lian-Ming Gao	高连明	TaxPP		Kunming Institute of Botany (KUN), CAS, Kunming, Yunnan
Chunmei He	何春梅	EricaPP		Guangdong Provincial Key Laboratory of Silviculture, Protection and Utilization, Guangdong Academy of Forestry, Guangzhou, Guangdong
Yi He	何毅	BoraPP, BoralesPP		Ministry of Education, Key Laboratory for Biodiversity Science and Ecological Engineering, College of Life Sciences, Beijing Normal University, Beijing
Xue-Ying Hu	胡雪莹	AstPP, CycadPP, EmbPP, MyrtPP		School of Life Sciences, Peking University, Beijing
Chen-Kun Jiang	蒋陈焜	APP, AstPP, EmbPP, LiliPP, MyrtPP		School of Life Sciences, Peking University, Beijing
Hanlin Lei	雷翰霖	AbiesPP, AlisPP, ApiaPP, MalpighPP, MalvPP, MeliaPP, PinusPP, SapPP, SimaPP		Center for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, CAS, Mengla, Yunnan
Bo Li	李波	LamPP, LamialesPP, PhrymaPP, SolPP		Research Centre of Ecological Sciences, Jiangxi Agricultural University, Nanchang, Jiangxi
Heng Li	李恒	AraceaePP		Kunming Institute of Botany (KUN), CAS, Kunming, Yunnan
Huaicheng Li	黎怀成	AmaranthPP, BrassPP, BursPP, CostaPP, CupPP, GeranPP, MarantPP, RanPP, RosPP, VitalesPP		Institute of Biology, Botany, Freie Universität Berlin, Berlin
Bing Liu	刘冰	AnacardPP		Institute of Botany, Chinese Academy of Sciences (IBCAS), Beijing
Hongmei Liu	刘红梅	PtPP		Center for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, CAS, Mengla, Yunnan
Shih-Hui Liu	劉世慧	AspPP, AsphodPP		National Sun Yat-sen University, Kaohsiung, Taiwan
Peng-Fei Ma	马朋飞	ArundPP, BambPP		Kunming Institute of Botany (KUN), CAS, Kunming, Yunnan
Fengjuan Mou	牟凤娟	RutPP		Faculty of Forestry, Southwest Forestry University, Kunming, Yunnan
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Chia-Ying Ou	歐家榮	AsphodPP		National Sun Yat-sen University, Kaohsiung, Taiwan
Xin-Sheng Qin	秦新生	ApocynPP		College of Forestry and Landscape Architecture, South China Agricultural University, Guangzhou, Guangdong
Jin-Hua Ran	冉进华	PiceaPP		State Key Laboratory of Plant Diversity and Specialty Crops & Key Laboratory of Systematic and Evolutionary Botany, Institute of Botany, CAS, Beijing
Na Su	苏娜	BerbPP		College of Life Sciences, Northwest A&F University, Northwest Sci-Tech University of Agriculture and Forestry, Yangling, Shaanxi
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Chunlei Xiang	向春雷	LamPP, LamSubfamPP		Kunming Institute of Botany (KUN), CAS, Kunming, Yunnan
Tian-Wen Xiao	肖天文	LauraPP		South China Botanical Garden, CAS, Guangzhou, Guangdong
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Gang Yao	姚纲	ArecaPP, CaryoPP, EuphorbPP		College of Forestry and Landscape Architecture, South China Agricultural University, Guangzhou, Guangdong
Wen Ye	叶文	BPP		South China Botanical Garden, CAS, Guangzhou, Guangdong
Wen-Bin Yu	郁文彬	AbiesPP, AlisPP, ApiaPP, CactusPP, IrisPP, MalpighPP, MalvPP, MeliaPP, PinusPP, PipPP, PodoPP, SapPP, SapotPP, SimaPP		Center for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, CAS, Mengla, Yunnan
Huajie Zhang	张华杰	PolygonPP		Wuhan Botanical Garden, CAS, Wuhan; Center of Conservation Biology, Core Botanical Gardens, CAS, Wuhan, Hubei
Li Zhang	张力	BPP		Fairy Lake Botanical Garden, CAS, Shenzhen, Guangdong
Rong Zhang	张荣	FabPP		Kunming Institute of Botany (KUN), CAS, Kunming, Yunnan
Shu-Dong Zhang	张书东	CucuPP, RosPP		Liupanshui Normal University, Liupanshui, Guizhou
Xin-Hui Zhang	张新慧	CactusPP		Center for Integrative Conservation, Xishuangbanna Tropical Botanical Garden, CAS, Mengla, Yunnan
Liang Zhao	赵亮	BerbPP		College of Life Sciences, Northwest A&F University, Yangling, Shaanxi
Xin Zhong	钟鑫	LiliPP, TPP		Shanghai Chenshan Botanical Garden, Shanghai



## 附录2 中文版植物系统发生海报网址

### Appendix 2 URLs of the Chinese versions of the Plant Phylogeny Posters

类群名 Taxon name	类群中文名 Taxon name in Chinese	海报缩写 Abbreviation of poster name	网址 URL
Angiosperms	被子植物	APP	<a href="https://www.researchgate.net/publication/312165614_beizizhiwudexitongfasheng_-_youhuazhiwudexitongfenlei_Chinese_version_of_Angiosperm_Phylogeny_Poster_APP">https://www.researchgate.net/publication/312165614_beizizhiwudexitongfasheng_-_youhuazhiwudexitongfenlei_Chinese_version_of_Angiosperm_Phylogeny_Poster_APP</a>
Bryophytes	苔藓植物	BPP	<a href="https://www.researchgate.net/publication/315575597_taixianzhiwuxitongfayu_BPP_2021_Chinese">https://www.researchgate.net/publication/315575597_taixianzhiwuxitongfayu_BPP_2021_Chinese</a>
Pteridophytes	蕨类和石松类植物	PtPP	<a href="https://www.researchgate.net/publication/363729348_jueleiheshisongleixitongfayuhaibao_PtPP_CN">https://www.researchgate.net/publication/363729348_jueleiheshisongleixitongfayuhaibao_PtPP_CN</a>
Tracheophytes	维管植物	TPP	<a href="https://www.researchgate.net/publication/310774618_weiguanshuzhiwuxitongfayu_TPP_CN">https://www.researchgate.net/publication/310774618_weiguanshuzhiwuxitongfayu_TPP_CN</a>
Embryophytes	有胚植物	EmbPP	<a href="https://www.researchgate.net/publication/360113840_youpeizhiwu_lushengzhiwuyanhuaquanxiyutezhe ng_EmbPP_Chinese">https://www.researchgate.net/publication/360113840_youpeizhiwu_lushengzhiwuyanhuaquanxiyutezhe ng_EmbPP_Chinese</a>
<i>Abies</i>	冷杉属	AbiesPP	<a href="https://www.researchgate.net/publication/379898429_lengshanshuxitongfayuhaibao_AbiesPP_Chinese">https://www.researchgate.net/publication/379898429_lengshanshuxitongfayuhaibao_AbiesPP_Chinese</a>
Alismatales	泽泻目	AlisPP	<a href="https://www.researchgate.net/publication/372078697_ALISMATALES_zexiemuxitongfayuguanxiyuxin_gzhuang_AlisPP_Chinese">https://www.researchgate.net/publication/372078697_ALISMATALES_zexiemuxitongfayuguanxiyuxin_gzhuang_AlisPP_Chinese</a>
Amaranthaceae	苋科	AmaranthPP	<a href="https://www.researchgate.net/publication/383383911_xiankexitongfashenghaibao_AMARANTHACEA E_AmaranthPP_Chinese">https://www.researchgate.net/publication/383383911_xiankexitongfashenghaibao_AMARANTHACEA E_AmaranthPP_Chinese</a>
Anacardiaceae	漆树科	AnacardPP	<a href="https://www.researchgate.net/publication/370654165_qishukexitongfashengshuhaibao_Anacardiaceae AnaPP_Chinese">https://www.researchgate.net/publication/370654165_qishukexitongfashengshuhaibao_Anacardiaceae AnaPP_Chinese</a>
Apiaceae	伞形科	ApiaPP	<a href="https://www.researchgate.net/publication/372787977_sanxingke_APIACEAE_sanxingkeyixiezongyao daibiaoshu_ApiaPP_Chinese">https://www.researchgate.net/publication/372787977_sanxingke_APIACEAE_sanxingkeyixiezongyao daibiaoshu_ApiaPP_Chinese</a>
Apocynaceae	夹竹桃科	ApocynPP	<a href="https://www.researchgate.net/publication/333812396_jiazhutaokexitongfayuhaibao_Chinese_version_of_the_APOCYNACEAE_PHYLOGENY_POSTER_2019">https://www.researchgate.net/publication/333812396_jiazhutaokexitongfayuhaibao_Chinese_version_of_the_APOCYNACEAE_PHYLOGENY_POSTER_2019</a>
Araceae	天南星科	AraceaePP	<a href="https://www.researchgate.net/publication/338718929_tiannanxingkexitongfayuhaibao_ARACEAE_Phyl ogeny_Poster_Chinese">https://www.researchgate.net/publication/338718929_tiannanxingkexitongfayuhaibao_ARACEAE_Phyl ogeny_Poster_Chinese</a>
Arecaceae (Palms)	棕榈科	ArecaPP	<a href="https://www.researchgate.net/publication/369901626_zonglukexitongfayuhaibao-zonglukexitongfayushu_AREACEAE">https://www.researchgate.net/publication/369901626_zonglukexitongfayuhaibao-zonglukexitongfayushu_AREACEAE</a>
Arundinarieae	青篱竹族	ArundPP	<a href="https://www.researchgate.net/publication/357168620_ARUNDINARIEAE_qinglizhuzu_-_wendaimubenzhuleidexitongfayuguanxi">https://www.researchgate.net/publication/357168620_ARUNDINARIEAE_qinglizhuzu_-_wendaimubenzhuleidexitongfayuguanxi</a>
Asphodelaceae	阿福花科	AsphodPP	<a href="https://www.researchgate.net/publication/373659375_afuhukexitongfayuhaibao ASPHODELACEAE AsphodPP_Chinese">https://www.researchgate.net/publication/373659375_afuhukexitongfayuhaibao ASPHODELACEAE AsphodPP_Chinese</a>
Asparagaceae	天门冬科	AspPP	<a href="https://www.researchgate.net/publication/369763629_AS PARAGACEAE_tianmendongkexitongfayuhai bao_AspPP_Chinese">https://www.researchgate.net/publication/369763629_AS PARAGACEAE_tianmendongkexitongfayuhai bao_AspPP_Chinese</a>
Asteraceae	菊科	AstPP	<a href="https://www.researchgate.net/publication/360514983 ASTERACEAE_jukezhiwudaibiaoshudexitongfas heng_AstPP_CN">https://www.researchgate.net/publication/360514983 ASTERACEAE_jukezhiwudaibiaoshudexitongfas heng_AstPP_CN</a>
Bambuseae	箬竹族	BambPP	<a href="https://www.researchgate.net/publication/357157923_BAMBUSEAE_lezhuzu_-_redaimubenzhuleidexitongfayuguanxi">https://www.researchgate.net/publication/357157923_BAMBUSEAE_lezhuzu_-_redaimubenzhuleidexitongfayuguanxi</a>
Berberidaceae	小檗科	BerbPP	<a href="https://www.researchgate.net/publication/333603327_xiaobokexitongfayuhaibao_Berberidaceae Phylog eny_Poster_Chinese_version">https://www.researchgate.net/publication/333603327_xiaobokexitongfayuhaibao_Berberidaceae Phylog eny_Poster_Chinese_version</a>
Bignoniaceae	紫葳科	BignonPP	<a href="https://www.researchgate.net/publication/372913701_ziweikexitongfayuhaibao_Bignoniaceae_BignonP P_Chinese">https://www.researchgate.net/publication/372913701_ziweikexitongfayuhaibao_Bignoniaceae_BignonP P_Chinese</a>
Boraginaceae	紫草科	BoraPP	<a href="https://www.researchgate.net/publication/337829539_zicaokexitongfayuhaibao_Boraginaceae_Phyloge ny_Poster_2020_zhongwenban">https://www.researchgate.net/publication/337829539_zicaokexitongfayuhaibao_Boraginaceae_Phyloge ny_Poster_2020_zhongwenban</a>
Boraginales (other)	紫草目	BoralesPP	<a href="https://www.researchgate.net/publication/337829172_zicaomuxitongfayuhaibao_keheshudezuyanzheng hefeitezhengxingzhuang BORAGINALES PHYLOGENY POSTER_Chinese_version">https://www.researchgate.net/publication/337829172_zicaomuxitongfayuhaibao_keheshudezuyanzheng hefeitezhengxingzhuang BORAGINALES PHYLOGENY POSTER_Chinese_version</a>
Brassicaceae	十字花科	BrassPP	<a href="https://www.researchgate.net/publication/387066787_shizihukexitongfayuhaibao_BRASSICACEAE_BrassPP_ZN">https://www.researchgate.net/publication/387066787_shizihukexitongfayuhaibao_BRASSICACEAE_BrassPP_ZN</a>
Burseraceae	橄榄科	BursPP	<a href="https://www.researchgate.net/publication/373119829_ganlankexitongfashenghaibao_BurseraceaePP_Ch inese">https://www.researchgate.net/publication/373119829_ganlankexitongfashenghaibao_BurseraceaePP_Ch inese</a>
Cactaceae	仙人掌科	CactusPP	<a href="https://www.researchgate.net/publication/383705196_xianrenzhangkexitongfayuhaibao CACTACEAE_CactusPP_Chinese">https://www.researchgate.net/publication/383705196_xianrenzhangkexitongfayuhaibao CACTACEAE_CactusPP_Chinese</a>
Caryophyllales	石竹目	CaryoPP	<a href="https://www.researchgate.net/publication/360619545_Caryophyllales_shizhumuxitongfayuguanxihaibao _CPP_CN">https://www.researchgate.net/publication/360619545_Caryophyllales_shizhumuxitongfayuguanxihaibao _CPP_CN</a>
Costaceae	闭鞘姜科	CostaPP	<a href="https://www.researchgate.net/publication/373173873_biqiaojiangkexitongfashenghaibao COSTACEAE_CostaPP_Chinese_2023">https://www.researchgate.net/publication/373173873_biqiaojiangkexitongfashenghaibao COSTACEAE_CostaPP_Chinese_2023</a>
Crassulaceae	景天科	CrassPP	<a href="https://www.researchgate.net/publication/372493341_jingtiankedexitongfasheng_Crassulaceae_CrassPP_Chinese">https://www.researchgate.net/publication/372493341_jingtiankedexitongfasheng_Crassulaceae_CrassPP_Chinese</a>
Cucurbitaceae	葫芦科	CucuPP	<a href="https://www.researchgate.net/publication/340272049_hulukexitongfayuhaibao_Chinese_version_of_the _Cucurbitaceae_Phylogeny_Poster">https://www.researchgate.net/publication/340272049_hulukexitongfayuhaibao_Chinese_version_of_the _Cucurbitaceae_Phylogeny_Poster</a>
Cupressaceae	柏科	CupPP	<a href="https://www.researchgate.net/publication/381925410_baikexitongfashengshuhaibao_CUPRESSACEAE_CupPP_Chinese">https://www.researchgate.net/publication/381925410_baikexitongfashengshuhaibao_CUPRESSACEAE_CupPP_Chinese</a>
Cycadales	苏铁目	CycadPP	<a href="https://www.researchgate.net/publication/382295209_sutiemuxitongfashenghaibao_CYCADALES_Cyc adPP_Chinese">https://www.researchgate.net/publication/382295209_sutiemuxitongfashenghaibao_CYCADALES_Cyc adPP_Chinese</a>
Ericaceae	杜鹃花科	EricaPP	<a href="https://www.researchgate.net/publication/359789221_dujuanhuakexitongfayuhaibao_EricaceaePP_CN_2022">https://www.researchgate.net/publication/359789221_dujuanhuakexitongfayuhaibao_EricaceaePP_CN_2022</a>
Euphorbiaceae	大戟科	EuphorbPP	<a href="https://www.researchgate.net/publication/373690344_dajikexitongfayuhaibao EUPHORBIACEAE Eu phorbPP_Chinese">https://www.researchgate.net/publication/373690344_dajikexitongfayuhaibao EUPHORBIACEAE Eu phorbPP_Chinese</a>
Fabaceae	豆科	FabPP	<a href="https://www.researchgate.net/publication/361024224_Fabaceae_doukexitongfayuhaibao_FabPP_CN">https://www.researchgate.net/publication/361024224_Fabaceae_doukexitongfayuhaibao_FabPP_CN</a>
Fagales	壳斗目	FagalesPP	<a href="https://www.researchgate.net/publication/370230708_FAGALES_kedoumuxitongfayuhaibao FagaPP_Chinese">https://www.researchgate.net/publication/370230708_FAGALES_kedoumuxitongfayuhaibao FagaPP_Chinese</a>
Geraniales	牻牛儿苗目	GeranPP	<a href="https://www.researchgate.net/publication/372876194_mangniuermiaomu_GERANIALES_Phylogeny_P oster_Chinese">https://www.researchgate.net/publication/372876194_mangniuermiaomu_GERANIALES_Phylogeny_P oster_Chinese</a>
Iridaceae	鸢尾科	IrisPP	<a href="https://www.researchgate.net/publication/377565775_yuanweikexitongfayuhaibao_IRIDACEAE_IrisPP_Chinese">https://www.researchgate.net/publication/377565775_yuanweikexitongfayuhaibao_IRIDACEAE_IrisPP_Chinese</a>
<i>Kalanchoe</i>	伽蓝菜属	KalPP	<a href="https://www.researchgate.net/publication/386422721_KALANCHOE_jialancaishuxitongfashenghaibao_KalPP_Chinese">https://www.researchgate.net/publication/386422721_KALANCHOE_jialancaishuxitongfashenghaibao_KalPP_Chinese</a>
Lamiales	唇形目	LamialesPP	<a href="https://www.researchgate.net/publication/337414302_chunxingmuxitongfayuhaibao_Lamiales_Phyloge ny_Poster_Chinese_version">https://www.researchgate.net/publication/337414302_chunxingmuxitongfayuhaibao_Lamiales_Phyloge ny_Poster_Chinese_version</a>
Lamiaceae	唇形科	LamPP	<a href="https://www.researchgate.net/publication/351248645_chunxingkexitongfayuhaibao_56gedaibiaoshu_La m56_Chinese_version">https://www.researchgate.net/publication/351248645_chunxingkexitongfayuhaibao_56gedaibiaoshu_La m56_Chinese_version</a>



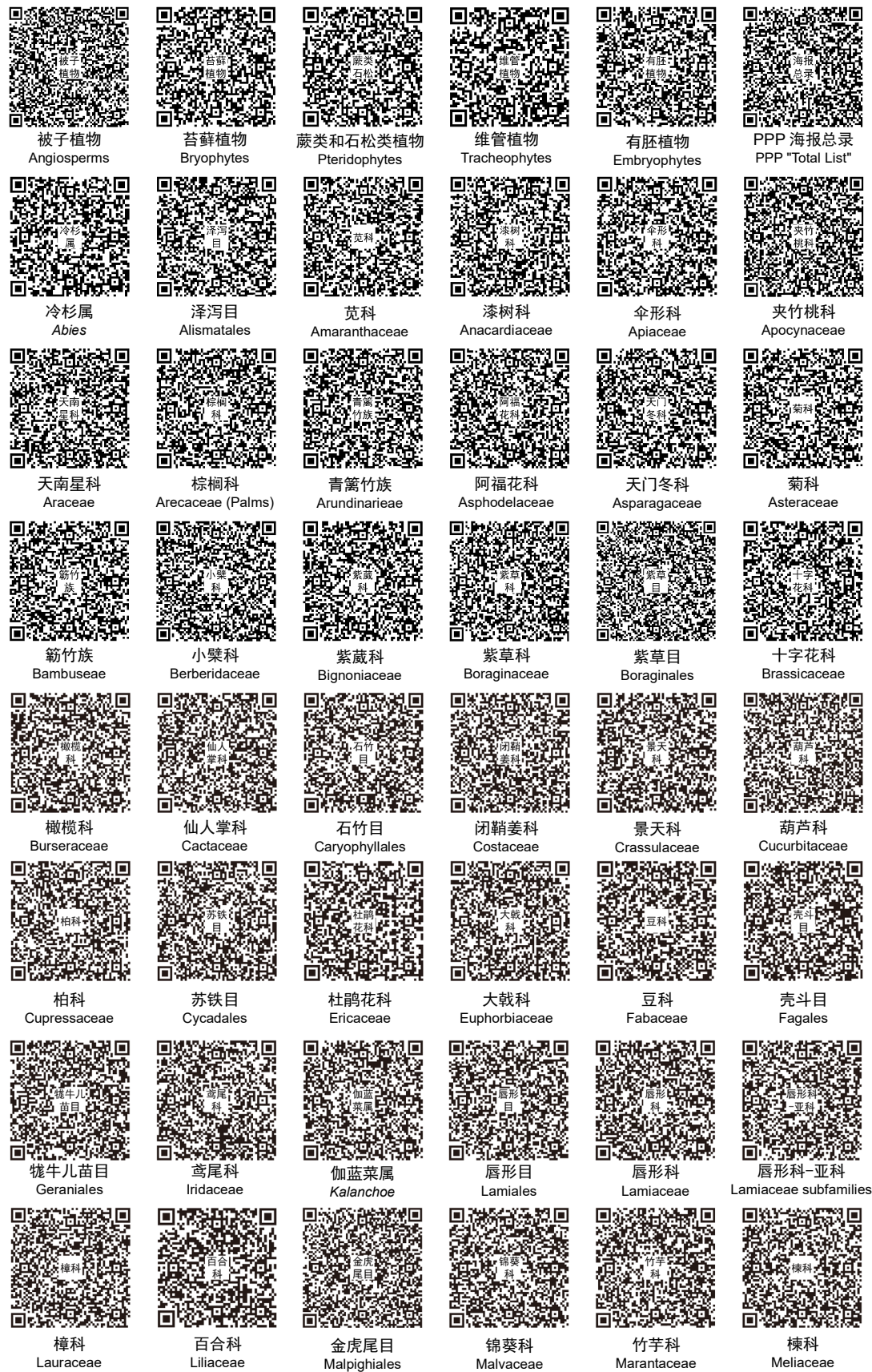
## 附录2 中文版植物系统发生海报网址(续)

### Appendix 2 URLs of the Chinese versions of the Plant Phylogeny Posters (continued)

类群名 Taxon name	类群中文名 Taxon name in Chinese	海报缩写 Abbreviation of poster name	网址 URL
Lamiaceae subfamilies	唇形科-亚科	LamSubfamPP	<a href="https://www.researchgate.net/publication/356191653_chunxingke-yake_LAMIACEAE_Subfamilies_CN_version">https://www.researchgate.net/publication/356191653_chunxingke-yake_LAMIACEAE_Subfamilies_CN_version</a>
Lauraceae	樟科	LauraPP	<a href="https://www.researchgate.net/publication/370818621_zhangkexitongfayuhaibao_LAURACEAE_LauraPP_Chinese">https://www.researchgate.net/publication/370818621_zhangkexitongfayuhaibao_LAURACEAE_LauraPP_Chinese</a>
Liliaceae	百合科	LiliPP	<a href="https://www.researchgate.net/publication/367391730_LILIACEAE_baiheke_LiliPP_Chinese">https://www.researchgate.net/publication/367391730_LILIACEAE_baiheke_LiliPP_Chinese</a>
Malpighiales	金虎尾目	MalpighPP	<a href="https://www.researchgate.net/publication/374756331_jinhuweimuxitongfayuhaibao_Malpighiales_Phyl ogeny_Poster_Chinese_version">https://www.researchgate.net/publication/374756331_jinhuweimuxitongfayuhaibao_Malpighiales_Phyl ogeny_Poster_Chinese_version</a>
Malvaceae	锦葵科	MalvPP	<a href="https://www.researchgate.net/publication/370818455_jinkuikexitongfayuhaibao-jinkuikedai biaoshu_MALVACEAE_MalvPP_Chinese">https://www.researchgate.net/publication/370818455_jinkuikexitongfayuhaibao-jinkuikedai biaoshu_MALVACEAE_MalvPP_Chinese</a>
Marantaceae	竹芋科	MarantPP	<a href="https://www.researchgate.net/publication/373435187_zhuyukexitongfashenghaibao_MARANTACEAE_MarantPP_Chinese">https://www.researchgate.net/publication/373435187_zhuyukexitongfashenghaibao_MARANTACEAE_MarantPP_Chinese</a>
Meliaceae	楝科	MeliaPP	<a href="https://www.researchgate.net/publication/373329862_liankeyitongfayuhaibao_MELIACEAE_MeliaPP_Chinese">https://www.researchgate.net/publication/373329862_liankeyitongfayuhaibao_MELIACEAE_MeliaPP_Chinese</a>
Moraceae	桑科	MorPP	<a href="https://www.researchgate.net/publication/369506998_Moraceae_sangkexitongfayuhaibao_MorPP_Chinese">https://www.researchgate.net/publication/369506998_Moraceae_sangkexitongfayuhaibao_MorPP_Chinese</a>
Myrtaceae	桃金娘科	MyrtPP	<a href="https://www.researchgate.net/publication/373256969_taojinniangke_MYRTACEAE_MyrtPP_Chinese">https://www.researchgate.net/publication/373256969_taojinniangke_MYRTACEAE_MyrtPP_Chinese</a>
Oleaceae	木犀科	OleaPP	<a href="https://www.researchgate.net/publication/370760525_muxikexitongfayushuhaibao_OLEACEAE_OleaPP_Chinese">https://www.researchgate.net/publication/370760525_muxikexitongfayushuhaibao_OLEACEAE_OleaPP_Chinese</a>
Papaveraceae	罂粟科	PapaPP	<a href="https://www.researchgate.net/publication/373328282_yingsukezhiwudaibiaoshudexitongfasheng_PAPAV ERACEAE_PapaPP_Chinese">https://www.researchgate.net/publication/373328282_yingsukezhiwudaibiaoshudexitongfasheng_PAPAV ERACEAE_PapaPP_Chinese</a>
Phrymaceae	透骨草科	PhrymaPP	<a href="https://www.researchgate.net/publication/356360927_PHRYMACEAE_touguakaokexitongfayuh aibao">https://www.researchgate.net/publication/356360927_PHRYMACEAE_touguakaokexitongfayuh aibao</a>
<i>Picea</i>	云杉属	PiceaPP	<a href="https://www.researchgate.net/publication/379543612_yunshanshuxitongfashengguanyxi_PiceaPP_Chinese">https://www.researchgate.net/publication/379543612_yunshanshuxitongfashengguanyxi_PiceaPP_Chinese</a>
<i>Pinus</i>	松属	PinusPP	<a href="https://www.researchgate.net/publication/379038265_songshuxitongfayukuangjia_PinusPP_Chinese">https://www.researchgate.net/publication/379038265_songshuxitongfayukuangjia_PinusPP_Chinese</a>
Piperales	胡椒目	PipPP	<a href="https://www.researchgate.net/publication/368426520_hujiaomuxitongfayukuangjia_PIPERALES_PipPP_Chinese">https://www.researchgate.net/publication/368426520_hujiaomuxitongfayukuangjia_PIPERALES_PipPP_Chinese</a>
Podocarpaceae	罗汉松科	PodoPP	<a href="https://www.researchgate.net/publication/381805876_luohansongkexitongfayuhaibao_PODOCARPAC EAE_PodoPP_Chinese">https://www.researchgate.net/publication/381805876_luohansongkexitongfayuhaibao_PODOCARPAC EAE_PodoPP_Chinese</a>
Polygonaceae	蓼科	PolygonPP	<a href="https://www.researchgate.net/publication/366634900_POLYGONACEAE_liaokexitongfayuhaibao_Pol ygonPP_Chinese">https://www.researchgate.net/publication/366634900_POLYGONACEAE_liaokexitongfayuhaibao_Pol ygonPP_Chinese</a>
Ranunculaceae	毛茛科	RanPP	<a href="https://www.researchgate.net/publication/342716326_maogenkedexitongfasheng_RanPP_Chinese_versi on_2020">https://www.researchgate.net/publication/342716326_maogenkedexitongfasheng_RanPP_Chinese_versi on_2020</a>
Rhamnaceae	鼠李科	RhamnaPP	<a href="https://www.researchgate.net/publication/377633810_RHAMNACEAE_shulikexitongfayuhaibao_Rha mPP_Chinese">https://www.researchgate.net/publication/377633810_RHAMNACEAE_shulikexitongfayuhaibao_Rha mPP_Chinese</a>
Rosaceae	蔷薇科	RosPP	<a href="https://www.researchgate.net/publication/339352800_qiangweikexitongfayuhaibao_Chinese_2020">https://www.researchgate.net/publication/339352800_qiangweikexitongfayuhaibao_Chinese_2020</a>
Rubiaceae	茜草科	RubPP	<a href="https://www.researchgate.net/publication/373097182_qiancaokexitongfayuhaibao_qiancaokedaibiaoxin gshu_RUBIACEAE_RubPP_Chinese">https://www.researchgate.net/publication/373097182_qiancaokexitongfayuhaibao_qiancaokedaibiaoxin gshu_RUBIACEAE_RubPP_Chinese</a>
Rutaceae	芸香科	RutPP	<a href="https://www.researchgate.net/publication/357701603_yunxiangkexitongfayuhaibao_RutPP_Chinese">https://www.researchgate.net/publication/357701603_yunxiangkexitongfayuhaibao_RutPP_Chinese</a>
Sapindaceae	无患子科	SapPP	<a href="https://www.researchgate.net/publication/373049461_wuhuanzikexitongfayuhaibao_SapindaceaePP_Ch inese">https://www.researchgate.net/publication/373049461_wuhuanzikexitongfayuhaibao_SapindaceaePP_Ch inese</a>
Sapotaceae	山榄科	SapotPP	<a href="https://www.researchgate.net/publication/380539913_shanlankeyitongfayuhaibao_SAPOTACEAE_Sap otPP_Chinese">https://www.researchgate.net/publication/380539913_shanlankeyitongfayuhaibao_SAPOTACEAE_Sap otPP_Chinese</a>
Simaroubaceae	苦木科	SimaPP	<a href="https://www.researchgate.net/publication/373237069_kumukexitongfayuhaibao_SIMAROUBACEAE_S imaPP_Chinese_2023">https://www.researchgate.net/publication/373237069_kumukexitongfayuhaibao_SIMAROUBACEAE_S imaPP_Chinese_2023</a>
Solanaceae	茄科	SolPP	<a href="https://www.researchgate.net/publication/335889946_jia_ke_de_xi_tong_fa_yu_-SolPP_2021_Chinese">https://www.researchgate.net/publication/335889946_jia_ke_de_xi_tong_fa_yu_-SolPP_2021_Chinese</a>
Taxaceae & Cephalotaxaceae	三尖杉科 和 红豆杉科	TaxPP	<a href="https://www.researchgate.net/publication/381668638_sanjianshankehehongdoushankexitongfayuhaibao _Cephalotaxaceae_Taxaceae">https://www.researchgate.net/publication/381668638_sanjianshankehehongdoushankexitongfayuhaibao _Cephalotaxaceae_Taxaceae</a>
Urticaceae	荨麻科	UrtPP	<a href="https://www.researchgate.net/publication/358638121_xunmakexitongfayuguanxi_UrtPP_Chinese">https://www.researchgate.net/publication/358638121_xunmakexitongfayuguanxi_UrtPP_Chinese</a>
Vitales	葡萄目	VitalesPP	<a href="https://www.researchgate.net/publication/343022168_putaomu_Vitales_Phylogeny_Poster_2021">https://www.researchgate.net/publication/343022168_putaomu_Vitales_Phylogeny_Poster_2021</a>
Zingiberaceae	姜科	ZingPP	<a href="https://www.researchgate.net/publication/325847037_jiangkedefenzixitong_ZPP_CN_2021">https://www.researchgate.net/publication/325847037_jiangkedefenzixitong_ZPP_CN_2021</a>

附录3 中文版植物系统发生海报网址二维码

Appendix 3 QR codes of the Chinese versions of the Plant Phylogeny Posters



附录3 中文版植物系统发生海报网址二维码(续)

Appendix 3 QR codes of the Chinese versions of the Plant Phylogeny Posters (continued)

